Remarks

(I) Objection to the specification

The Examiner states that "a brief description of drawings is unable to be located in the specification", and invites the Applicants to "provide the page and line that the Brief Description of Drawings are headed/located" (see page 2, lines 3-4 of the Office Action).

The Applicants respond to the Examiner that the Brief Description of the Drawings is found at page 17, line 2 to page 18, line 16 of the present specification.

(II) Rejection of the claims

Claims 1-34 and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite (see pages 2-3 of the Office Action). Claims 1-34 and 38 are also rejected under 35 U.S.C. 112, first paragraph, on the ground that "the specification . . . does not reasonably provide enablement for any type of 'reacting' processes" (see pages 3-4 of the Office Action). The Applicants disagree with the Examiner, and submit that the methods of the claims are clear and, on the basis of the teachings of the present specification, can be practiced by a person skilled in the art.

A careful review of the relevant MPEP sections, such as MPEP §§ 2164, 2173, 2174 shows that rejections such as the 112 rejection raised in the Office Action are usually used when there is at least one of two problems. The first problem relates to the specification disclosing that a certain unclaimed condition absolutely must be met or the invention will fail. In this situation, the can Examiner raise an objection, asserting that the condition must be recited in the claims. However, Applicants have not noticed an unclaimed condition, which is described in the 74 page application as being absolutely essential. Perhaps more importantly, the Examiner did not identify any condition which is believed to be essential to practice the invention. Without this information from the Examiner, Applicants have no way to evaluate whether the claims should be amended to include an additional condition.

The second problem that can cause a 112 rejection such as those raised by the Examiner arises when the claims cover subject matter, which is not enabled by the specification. The Examiner is referred to MPEP section 2164.08, which indicates that the first step is to properly interpret the claims. The MPEP makes it clear that this interpretation of the claims must be a reasonable interpretation. Accordingly, even though claim 1 recites "performing a reaction," because of the other conditions on the reactants, products and subsequent use thereof, it is

unreasonable to read the claimed reaction on all reactions. The MPEP makes it clear that after the claims are reasonably interpreted, the Examiner should identify the claimed subject matter which is enabled and that which is not enabled. MPEP section 2164.08 describes in detail the importance of identifying subject matter believed to be enabled and that which is not. The Office Action contains no mention of any subject matter covered by the claims but not enabled by the specification. It is submitted that the rejections are in prima facie invalid because they do not identify the non-enabled subject matter and therefore cannot be addressed. Moreover, as discussed below, Applicants submit that the specification is enabling for the full scope of the claims.

Applicants discuss the foregoing with the Examiner. The Examiner's time in preparing for and conducting the interview is acknowledged and gratefully appreciated. During the interview, the Examiner seemed to understand Applicants' position.

Claim 1 reads as follows:

> 1. A method for producing an aromatic carbonate, comprising:
> (1) performing a reaction between an organometal compound and carbon dioxide to obtain a reaction mixture containing a dialkyl carbonate formed by the reaction,
> (2) separating said dialkyl carbonate from said reaction mixture to obtain a residual liquid, and
> performing the following steps (3) and (4) in either order, or partially or wholly simultaneously:
> (3) reacting said residual liquid with an alcohol to form at least one organometal compound and form water and removing said water from said organometal compound, and
> (4) reacting said dialkyl carbonate separated in step (2) with an aromatic hydroxy compound to obtain an aromatic carbonate.

The method of claim 1 comprises four steps (1) to (4), in each of which a reaction or a separation is performed. The outline of steps (1) to (4) is described at page 31, line 7 to page 36, line 17 of the present specification, and the compounds used in steps (1) to (4) are described at page 44, line 14 to page 74, line 23 of the present specification. The method of claim 1 is summarized as follows:

An organometal compound is reacted with carbon dioxide to obtain a reaction mixture containing a dialkyl carbonate (step (1)). The reaction mixture is separated into the dialkyl carbonate and a residual liquid (step (2)), wherein the residual liquid is reacted with an alcohol to form an organometal compound and water (step (3)), and wherein the dialkyl carbonate is reacted with an aromatic hydroxy compound to obtain an aromatic carbonate (step (4)). It

should be noted that the reaction (i.e., transesterification reaction) performed in step (4) between the dialkyl carbonate and the aromatic hydroxy compound produces an alcohol. One essential feature of the method of claim 1 is that an organometal compound is reacted with carbon dioxide in step (1) to obtain a reaction mixture, from which an organometal compound as usable in step (1) is regenerated in step (3).

Although claim 1 does not recite any recycling step, preferred embodiments of the method of the present invention involve a recycling step. For example, in a preferred embodiment, the organometal compound formed in step (3) is recycled to step (1). Also, in another preferred embodiment, the alcohol produced in step (4) by the reaction between the dialkyl carbonate and the aromatic hydroxy compound is recycled to step (3). Fig. 1 is a flow chart showing the method of the present invention, in which such recycling step is involved.

Thus, in the method of the present invention, intermediate products generated during the production of the desired aromatic carbonate can be recycled, and only an aromatic carbonate and water are obtained as products from carbon dioxide and an aromatic hydroxy compound as raw materials, wherein substantially no raw materials other than carbon dioxide and the aromatic hydroxy compound are necessary.

Claim 1 does not recite any reaction parameter or the like, because it is not essential to the method of claim 1. On this point, a detailed explanation is given below.

Step (1) is characterized in that a reaction between an organometal compound and carbon dioxide is performed to obtain a reaction mixture containing a dialkyl carbonate formed by the reaction. The amounts of the compounds used in step (1) and the reaction conditions are not essential to step (1).

The method for practicing step (1) is described at page 75, line 2 to page 81, line 16 of the present specification. In this connection, it should be noted that the organometal compound used in step (1) is described at page 44, line 16 to page 64, line 24 of the present specification. Therefore, on the basis of the teaching of the present specification, a person skilled in the art can practice step (1).

Step (2) is characterized in that the dialkyl carbonate contained in the reaction mixture obtained in step (1) is separated from the reaction mixture to obtain a residual liquid. The method for the separation is not essential to step (2).

The method for practicing step (2) is described at page 81, line 17 to page 104, line 3 of the present specification. Therefore, on the basis of the teaching of the present specification, a person skilled in the art can practice step (2).

Step (3) is characterized in that the residual liquid obtained in step (2) is reacted with an alcohol to form at least one organometal compound and form water, wherein the water is removed from the organometal compound. The amounts of the substances used in step (3), the reaction conditions and the method for the removal of water are not essential to step (3).

The method for practicing step (3) is described at page 104, line 4 to page 113, line 24 of the present specification. In this connection, it should be noted that the alcohol used in step (3) is described at page 67, line 21 to page 71, line 4 of the present specification. Therefore, on the basis of the teaching of the present specification, a person skilled in the art can practice step (3).

As explained above, in step (3), an organometal compound as usable in step (1) is regenerated. The reason for this is as follows. The residual liquid recited in step (3) (and step (2)) is derived from the reaction mixture obtained in step (1) by the reaction between an organometal compound and carbon dioxide. Therefore, the residual liquid contains a compound derived from the organometal compound used in step (1). By the reaction of such a residual liquid with an alcohol in step (3), an organometal compound as usable in step (1) is automatically regenerated.

Step (4) is characterized in that the dialkyl carbonate separated in step (2) is reacted with an aromatic hydroxy compound to obtain an aromatic carbonate. The amounts of the compounds used in step (4) and the reaction conditions are not essential to step (4).

The method for practicing step (4) is described at page 113, line 25 to page 146, line 20 of the present specification. In this connection, it should be noted that the aromatic hydroxy compound used in step (4) is described at page 71, line 5 to page 74, line 23 of the present specification. Therefore, on the basis of the teaching of the present specification, a person skilled in the art can practice step (4).

As explained above, the reaction (i.e., transesterification reaction) performed in step (4) between the dialkyl carbonate and the aromatic hydroxy compound produces an alcohol, which can be recycled to step (3).

As seen from the above, the method of claim 1 is clear and, on the basis of the teaching of the present specification, can be practiced by a person skilled in the art.

Each of the remaining claims is directed to a preferred embodiment of the method of claim 1 and, on the basis of the teaching of the present specification, can be practiced by a person skilled in the art. (It should be noted that claim 38, drafted in the form of an independent claim, is actually directed to one preferred embodiment of the method of claim 1.) For example, in claims 12 or 13, the organometal compound used in step (1) is limited to a specific one, and the organometal compound specified in claim 12 or 13 is described at page 44, line 16 to page 64, line 24 of the present specification. On the basis of the teaching of the present specification, a person skilled in the art can practice the method of claim 12 or 13.

From the above, it is apparent that the methods of the claims are clear and, on the basis of the teaching of the present specification, can be practiced by a person skilled in the art.

As described in the present specification under "Prior Art", there are a number of conventional methods for producing an aromatic carbonate; however, these conventional methods have various problems, such as the use of a toxic substance as a raw material; the corrosion of the production equipment due to a chlorine-containing compound; the cumbersome operation for the removal of a by-product (such as a chlorine-containing compound); and the difficulty in the conversion of a co-product to a raw material. Even when carbon dioxide (which has substantially no toxicity and contains no chlorine compound) is used as a carbonyl source, there still are problems, such as the generations of a co-product and a by-product derived from a dehydrating agent used, and the need for regeneration or disposal of a dehydrating agent.

All of the problems accompanying the prior art can be solved by the method of the present invention. Specifically, as explained above, in the method of the present invention, intermediate products generated during the production of the desired aromatic carbonate can be recycled, and only an aromatic carbonate and water are obtained as products from carbon dioxide and an aromatic hydroxy compound as raw materials, wherein substantially no raw materials other than carbon dioxide and the aromatic hydroxy compound are necessary. Therefore, the method of the present invention is advantageous not only in that the method does not need the use of any toxic substance and is free from the generation of any corrosive substance, but also in that the amounts of by-products are very small and intermediate products generated during the production of the aromatic carbonate can be recycled, so that the method of the present invention is favorable from the view point of protection of environment, and enables a simple and efficient production of a high purity aromatic carbonate.

(III) Conclusion

From the foregoing, it is firmly believed that the Examiner's objection and rejection have been overcome. Early and favorable action is respectfully solicited.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: Aug 12 2005 By: _____

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